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Planning Predicts Dental Service Attendance and the Effect is Moderated by Dental Anxiety and Educational Status: Findings from a One-Year Prospective Study

Amir H. Pakpour
Qazvin University of Medical Sciences, Iran

Paul Gellert
Newcastle University, UK

Saeed Asefzadeh
Qazvin University of Medical Sciences, Iran

Falko F. Sniehotta*
Newcastle University, UK

Background: The aim of this study was to investigate whether planning a dental appointment is a predictor of actual dental visits over a one-year period when controlling for past attendance, demographic factors, and dental health beliefs. In addition, the planning–attendance association was explored to determine whether dental anxiety and educational status moderated this relationship. **Methods:** A total of $N = 1{,}422$ adults with a mean age of $M = 44.4$ ($SD = 11.0$) years and resident in Iran participated in a prospective study over a one-year period. The primary outcome was self-reported dental appointment attendance at one-year follow-up, which was validated using clinical records. Action planning, coping planning, health beliefs, age, dental insurance, income, dental health status, dental anxiety, and years of education were assessed at baseline by self-report questionnaire. Data were analysed using multivariate logistic regression. **Results:** Action planning and coping planning were significantly associated with dental appointment attendance at one-year follow-up. Planning a dental appointment was more predictive of dental appointment attendance for people with higher levels of education and

* Address for correspondence: Falko Sniehotta, Institute of Health and Society, Medical Faculty, Newcastle University, Baddiley-Clark Building, Richardson Road, Newcastle NE2 4AX, UK. Email: falko.sniehotta@ncl.ac.uk

lower dental anxiety. **Conclusions:** The findings of this study suggest that implementation of the behaviour change technique planning into routine dental practice may have the potential to increase dental appointment attendance rates.

Keywords: dental attendance, oral care behaviour, planning

INTRODUCTION

Dental appointment attendance is associated with better oral health, lower plaque and calculus levels, and better individual oral self-care, such as tooth brushing and use of additional dental hygiene products (Hill, Chadwick, Freeman, O'Sullivan, & Murray, 2013). However, current rates of dental appointment attendance in line with government recommendations are low worldwide. For example, only 61 per cent of UK adults and 56 per cent of Iranian adults reported attending a dental appointment within the previous 12 months in 2009 and 2011, respectively (Bayat, Murtomaa, Vehkalahti, & Tala, 2011; Hill et al., 2013).

Forming simple plans when, where, and how to act is associated with better oral health care behaviour (Pakpour, Hidarnia, Hajizadeh, & Plotnikoff, 2012; Schuz, Sniehotta, Wiedemann, & Seemann, 2006; Sniehotta, Araujo Soares, & Dombrowski, 2007) and increased attendance at routine medical appointments (Sheeran & Orbell, 2000). However, to date there is a lack of studies that have applied planning to dental appointment attendance.

Planning is a simple strategy that acts to prompt intended behaviour including dental appointment attendance. Typically two types of planning are distinguished. Action planning specifies when, where, and how an intended behaviour will be implemented (Gollwitzer, 1999). In terms of dental appointment attendance this could involve a plan of the time, date, and means of transportation to attend the actual appointment. Coping planning refers to anticipating difficulties or barriers to performing the intended behaviour and includes a detailed plan of how to overcome such difficulties (Kwasnicka, Presseau, White, & Sniehotta, 2013; Sniehotta, Schwarzer, Scholz, & Schüz, 2005). Planning has proven to be effective when targeting a range of health behaviours including oral care behaviour such as dental flossing (Schuz et al., 2006; Sniehotta et al., 2007) and tooth brushing (Pakpour et al., 2012; Pakpour & Sniehotta, 2012). However, the predictive utility of planning for attendance at dental appointments has yet to be fully established. Sniehotta et al. (2007) have demonstrated that plans formed as part of a "one-minute intervention" can significantly improve oral self-care behaviours and this effect could be extended to increasing dental attendance.

Planning has been hypothesised to be particularly effective for individuals who have already formed an intention to act (Schwarzer, 1992). Various social-cognitive theories identify an explicit intention to act and a sense of behavioural control or self-efficacy as key motivational determinants of behaviour. Furthermore, empirical evidence supports the key role of these variables in predicting behaviour change (McEachan, Conner, Taylor, & Lawton, 2011). However, there is evidence that a significant intention–behaviour gap exists which planning is hypothesised to bridge (Sniehotta et al., 2005). Two additional risk factors that have a negative impact on dental appointment attendance which are not explicitly addressed by social cognitive models are low educational level and dental anxiety (Hill et al., 2013; Listl, 2012; Sabbah & Sheiham, 2010).

Higher educational attainment is reported to be associated with regular dental appointment attendance, and in turn is contributing towards socio-economic inequalities in oral health (Listl, 2012). This finding is consistent with the broader evidence for health service utilisation (Elo, 1992), and the mechanisms of the relationship between education and attendance are not fully understood. Adults with higher educational attainment levels are generally more aware of existing medical services, and as such access information and health care services more frequently (Mechanic, 2002). Furthermore, evidence suggests that educational status is related to the capacity to translate behavioural intentions into actual behaviour. Several studies have reported that higher educational attainment and socioeconomic status are associated with a stronger intention–health behaviour relationship (Godin et al., 2010).

Approximately 20 per cent of the adult population experience dental anxiety (Armfield, Spencer, & Stewart, 2006). Specific to the field of dental health, there is considerable evidence that individuals with dental anxiety are less likely to attend routine dental appointments (Hill et al., 2013). The lack of dental health service uptake may result in reduced oral health and associated symptoms such as dental pain, which may in turn increase anxiety (Armfield et al., 2006). There is evidence for the effectiveness of psychological interventions for reducing dental anxiety in adults (Eli, Uziel, Blumensohn, & Baht, 2004). This suggests that such treatments hold the potential to positively affect dental appointment attendance rates. What is not known is whether anxiety affects the relationship between planning and actual attendance at routine dental appointments.

The aim of the current study was to investigate whether planning a dental appointment is a predictor of actual dental visits over a one-year period when controlling for past attendance, demographic factors, intentions, and perceived behavioural control about dental appointment attendance. In addition, the planning–attendance association was explored to

determine whether dental anxiety and educational status moderated this relationship.

METHODS

Sample and Recruitment

This study was conducted between February 2012 and June 2013. The target population was adults living in Qazvin, Iran. Approximately 86 per cent of Qazvin residents are reported to be literate and 31 per cent of the population is under 20 years old. Health care and public health services in Iran are provided through a nationwide network providing primary health care to the entire Iranian population. This includes oral health, which is free at the point of use. The primary health care network provides urban health centres in towns and cities covering a population of approximately 12,000 people per centre. Each centre maintains health records of all people within its catchment area. There are currently 32 urban health centres in Qazvin, Iran, and 10 of these were selected at random to participate in the study. A total of 1,500 adults across these centres who met the eligibility criteria were invited by telephone to participate in the study. Inclusion criteria were adults aged ≥18 years with the ability to read and write in Persian. Exclusion criteria were adults enrolled in any other oral health education programme; and those with both complete maxillary and mandibular dentures.

Procedure

This was a prospective study conducted over a one-year period. All participants were provided with information about the aims of the study before being asked to provide informed written consent. The study procedure was approved by the ethics committee of the Qazvin University of Medical Sciences (QUMS). A total of 1,500 eligible adults were approached to participate in the study. Of those contacted, $n = 73$ (4.9%) declined to participate. Adults who consented to participate were requested to complete a questionnaire at baseline (Time 1) assessing past behaviour (dental appointment attendance), health beliefs regarding dental visits (Ajzen, 1991; Lavin & Groarke, 2005), and demographics. The questionnaires were delivered in person by a health psychologist at the urban health centres. Questionnaires took approximately 11 minutes to complete before participants were asked to attend an assessment to determine dental health status by two dentists. On average this process was 6 minutes in duration.

At one-year follow-up (Time 2), participants were asked to complete a questionnaire that enquired about attendance at a dental appointment as the primary outcome.

Measures

Demographics. Information on age, sex, marital status, monthly household income, dental insurance, dental brushing, and dental flossing were collected by questionnaire at baseline (Time 1). Each demographic was considered as a covariate for the purpose of analyses. Educational status was measured as years spent in formal education.

Dental Anxiety. Dental anxiety was measured using the Dental Anxiety Scale (DAS; Corah, Gale, & Illig, 1978). The DAS has four items which assess reactions to an imagined dental situation. All items are scored on a 5-point Likert scale ranging from 1 (calm) to 5 (terrified). The DAS has been used extensively, was found to be valid and reliable in adult populations (Neverlien, 1990), and has been translated and validated in the Persian language (Salem, Kousha, Anissian, & Shahabi, 2012).

Dental Health Status. The number of *d*ecayed, *m*issing, and *f*illed *t*eeth (DMFT) was used to calculate the DMFT index. The dental examination to detect DMFT was carried out by two trained examiners in urban health centres in accordance with the World Health Organization (WHO)'s recommendations using a flat mouth mirror and WHO probe under a dental light (WHO, 1997).

Health Belief Measures. In accordance with the Reasoned Action Approach, measures of behavioural intentions and perceived behavioural control (PBC) were developed based on standard guidance as recommended by Francis et al. (2004) and Ajzen (2006). *Perceived Behavioural Control* (PBC) was measured with five items (For example: "It is up to me whether or not I visit the dentist every six months in the future"; Cronbach's $\alpha = .92$). *Behavioural intention* consisted of a three-item scale (For example: "I intend to visit the dentist every six months in the future"; Cronbach's $\alpha = .91$).

Action Planning and Coping Planning. Planning was measured by the Action Planning and Coping Planning Scales (Sniehotta et al., 2005) with three items for action planning: "I have made a detailed plan regarding (a) when to, (b) where, (c) how often, and (d) how to visit the dentist in the future" (Cronbach's $\alpha = .93$); and five items to assess coping planning, for example, "I have made a detailed plan regarding what to do if something interferes with my plans" (Cronbach's $\alpha = .88$), both scored on a 5-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree). These scales were previously translated and cross-validated in the Persian language in an Iranian sample (Pakpour et al., 2012).

Dental Appointment Attendance. Dental appointment attendance at baseline (Time 1) was measured with a single question: "Did you visit the dentist within the last 12 months?" In addition, participants were asked to answer the following question: "What was the reason for your last dental visit?" If they responded with "yes", the answer was coded as "check-up" or "emergency". To test the validity of the self-report measure, a correlation between the self-reported measure and the clinical record was calculated. The substantial correlation between self-reported behaviour and available oral clinical record ($r = .72$, $n = 249$) indicated that sufficient validity of the self-report measure was given. Divergences between the two measures might be due either to imperfect recording in health centres or to recall bias. Furthermore, electronic procedures for recording medical and health information are not regularly implemented in Iran, which may limit the accuracy of the clinical records. Dental appointment attendance behaviour at Time 2 was framed in terms of the target (dentist), action (visiting the dentist), time (in given time), and context (at clinic), as stipulated by Ajzen (1991). Participants at Time 2 were requested to indicate whether they had attended a dental appointment within the past 12 months.

Clinical Records of Dental Appointment Attendance. Available objective records of appointment attendance were used to validate the primary outcome measure in $n = 249$ participants.

Statistical Analyses

All data analyses were performed using SPSS 19. For bivariate associations phi correlation coefficients and Pearson product moment correlation coefficients for identifying associations between demographic variables (i.e. age, sex, education, income) and dental appointment attendance at baseline (Time 1) were calculated. Testing the main hypotheses, a four-step hierarchical logistic regression was conducted, with dental appointment attendance behaviour at Time 2 as a dichotomous dependent variable. In a first step, age, sex, years of education, dental insurance, dental health status, monthly household family income, dental anxiety, and dental appointment attendance at Time 1 were entered into the model. In the second step, perceived behavioural control and behavioural intentions were added into the equation. In step three, action planning and coping planning were also entered into the model. In a final step, the interaction terms action planning × education; coping planning × education; action planning × dental anxiety; and coping planning × dental anxiety were entered into the model. Continuous predictor variables were *z*-standardised (mean-centred with $M = 0$, $SD = 1$) to minimise problems associated with multicollinearity and to scale the variables meaningfully (Aiken & West, 1991). To visualise

the interaction effects, simple slope analyses were conducted (Hayes & Matthes, 2009). Furthermore, the Johnson–Neyman (J–N) technique was used to indicate for which levels of education and anxiety the effect of the action planning and coping planning on dental appointment attendance behaviour is statistically significant (region of significance; Johnson & Neyman, 1936). Multicollinearity was checked by calculating the variance inflation factor (VIF) and tolerance collinearity statistics among independent variables. A tolerance of less than 0.20 and a VIF of 5 and above was utilised to indicate problems associated with multicollinearity (O'Brien, 2007).

RESULTS

A total of $N = 1{,}422$ adults with a mean age of $M = 44.4$ ($SD = 11.0$) years participated in the current study. The majority of participants were female (58%) and married (85%). Irregular dental brushing (less than twice per day) and flossing (less than once per day) were identified for the majority of participants (67%). Approximately 55 per cent of the sample reported to have attended a dental appointment within the past year. Descriptive study variables are shown in Table 1. Only $n = 121$ adults (8.5%) did not provide data at Time 2. Table 1 shows that there were no significant differences between participants who completed T2 follow-up measures and those who did not on any of the study variables. Correlations between study variables are shown in Table 2. Age, dental insurance, income, dental health status (DMFT), dental anxiety (DAS), and years of education were significantly related to dental appointment attendance at Time 1, whereas income, dental anxiety, and years of education correlated significantly with adults' intentions to visit the dentist (Table 2). A strong correlation was found between PBC and behavioural intention ($r = .51$). Furthermore, action planning and coping planning correlated strongly with each other ($r = .54$) and with PBC and behavioural intention ($r = .50$ and .48 for action and coping planning, respectively). Action planning, coping planning, and PBC were significantly correlated with dental appointment attendance at Time 2 (r ranged from .39 to .53, $p < .01$). Dental appointment attendance at Time 1 was positively correlated with dental appointment attendance at Time 2 ($r = .53$).

There was an indication of multicollinearity among the independent variables as DMFT had a considerable VIF at step 3 and step 4. Therefore, DMFT was removed from the final model to prevent problems associated with multicollinearity. The results of the multivariate logistic regression analyses are shown in Table 3. Years of education, dental anxiety, household family income, and dental appointment attendance at Time 1 were significantly associated with dental appointment attendance at Time 2. Intention

TABLE 1
Sample Characteristics

Variables	*Time 1* (n = *1,427*)	*Dropped out at 12 months* (n = *121*)	p-*value*
Age (Mean ± *SD*)	44.39 ± 11.03	45.02 ± 10.67	.78
Years of education	6.59 ± 3.99	6.63 ± 4.33	.63
Household income (1,000 Rials)[1]	809.67 ± 437.24	792.374 ± 521.96	.56
Perceived behavioural control	2.18 ± 0.79	2.22 ± 0.73	.89
Behavioural intentions	2.61 ± 1.27	2.66 ± 0.76	.43
Action planning	2.14 ± 0.93	2.35 ± 0.72	.25
Coping planning	2.09 ± 1.16	2.19 ± 0.82	.42
Dental status (DMFT)	8.86 ± 5.90	9.1 ± 6.89	.60
Dental anxiety (DAS)	7.32 ± 3.12	7.19 ± 2.95	.67
Sex	n (%)		
Men	607 (42.5%)	52 (43%)	.49
Women	820 (57.5%)	69 (57.0%)	
Marital status			
Single	202 (14.2%)	12 (9.9%)	.32
Married	1209 (84.7%)	107 (88.4%)	
Divorced/ widowed	16 (1.1%)	2 (1.7%)	
Regular dental brushing			
No	961 (67.3%)	75 (62.0%)	.08
Yes	430 (30.1%)	44 (36.3%)	
Missing	36 (2.5%)	2 (1.7%)	
Regular dental flossing			
No	1075 (75.3%)	90 (74.4%)	.45
Yes	308 (21.6%)	27 (22.3%)	
Missing	44 (3.1%)	4 (3.3%)	
Dental attendance at Time 1			
Did not visit	643 (45.1%)	52 (43.0%)	.48
Emergency dental visiting	493 (34.5%)	44 (36.4%)	
Check dental visit	291 (20.4%)	25 (20.7%)	
Dental insurance			
No	1164 (81.6%)	98 (81.0%)	.30
Yes	263 (18.4%)	23 (19.0%)	

Note: [1] 30,500 Rials = 1 US Dollar, September 2013.

(OR = 2.58) and PBC (OR = 2.67) as well as education, dental anxiety, and Time 1 dental appointment attendance significantly predicted dental appointment attendance at Time 2 in the subsequent model (Step 2, Table 3). Action planning (OR = 1.95) and coping planning (OR = 2.06), entered in Step 3, as well as education, dental anxiety, Time 1 dental appointment attendance, intention, and PBC were significantly associated with dental appointment attendance at Time 2. As Table 3 (Step 4) shows, significant action planning × education (OR = 1.12) and coping planning × education

TABLE 2
Pearson and Phi Correlations of the Study Variables

Variables	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
1. Age	.05	.08	.07	.05	.08	.19**	.03	−.09	.01	.19**	.08	−.06	.12	.07
2. Sex†		.04	.19	.24	.07	−.15*	−.17*	−.08	.01	−.05	−.09	−.03	.02	.10
3. Dental insurance†			.17	.23	.22**	.28**	−.05	.10	.13	.35**	.12	.02	−.03	.42**
4. Dental floss				.19*	.17	.06	.14	.20**	.05	.09	−.08	.05	−.01	.08
5. Dental brush					.09	.04	.09	.08	.09	.07	.05	.06	.07	.03
6. Income						−.22**	.10	.11	.19*	.21*	.11	.12	.12	.16
7. Dental health status (DMFT)							.08	.07	.20*	.25**	.15*	.04	.03	.24**
8. Dental anxiety (DAS)								.07	−.28**	−.32**	−.23**	−.30**	.13	−.34**
9. Education in years									.26**	.21**	.39**	.08	.02	.19**
10. Intention										.30**	.50**	.48**	.51**	.30**
11. Dental attendance at Time 2											.41**	.41**	.39**	.53**
12. Action planning												.54**	.39**	.35**
13. Coping planning													.20**	.37**
14. PBC														
15. Dental attendance at Time 1†														

Note: ** = $p < .01$; * = $p < .05$. † Phi correlation coefficient.

TABLE 3
Binary Logistic Regression of Dental Visiting at Time 2 onto Age, Sex, Years of Education, Dental Health Status, Dental Insurance, Past Behaviour, Dental Anxiety, Perceived Behavioural Control, Intention to Dental Attendance, Action Planning, Coping Planning, and the Interaction Terms

	Step 1			*Step 2*			*Step 3*			*Step 4*		
Variables	β	*OR*	*95% CI for OR*	β	*OR*	*95% CI for OR*	β	*OR*	*95% CI for OR*	β	*OR*	*95% CI for OR*
Covariates												
Age	0.04	1.04	0.99/1.08	0.02	1.02	0.97/1.07	0.03	1.02	0.97/1.08	0.03	1.03	0.96/1.11
Sex[a]	0.10	1.11	0.51/2.40	–0.35	1.41	0.54/3.71	–0.25	1.30	0.47/3.58	–0.18	0.83	2.12/3.30
Education[b]	0.12*	1.13	1.01/1.26	0.16*	1.15	1.00/1.32	0.17*	1.18	1.03/1.36	0.24	0.78	0.59/1.06
Dental insurance												
No	Ref			Ref			Ref			Ref		
Yes	0.46	1.58	0.98/2.55	0.57	1.77	0.98/3.20	0.57	1.76	0.96/3.24	0.80	2.20	0.88/5.61
Family income	0.05	1.05	1.00/1.10	0.05	1.05	0.99/1.11	0.06	1.05	0.99/1.12	0.05	1.04	0.98/1.11
Dental anxiety	–0.37**	0.69	0.54/0.88	–0.48**	0.61	0.45/0.84	–0.61**	0.54	0.37/0.79	–0.51**	0.60	0.41/0.88
Past behaviour (Time 1)												
Did not visit	Ref			Ref			Ref			Ref		
Dental visit (Emergency)	0.95**	2.59	1.39/4.85	1.37***	3.92	1.80/8.50	1.24**	3.45	1.51/7.89	1.28*	3.61	1.07/12.10
Dental visit (Check-up)	1.45***	4.26	2.08/8.71	1.13**	3.08	1.27/7.50	1.10**	3.45	1.16/7.73	0.30	1.35	0.35/5.31
Health beliefs												
PBC				0.99***	2.67	1.62/4.45	0.92**	2.51	1.46/4.31	0.90**	2.46	1.25/4.83
Behavioural intention				0.95***	2.58	1.62/4.49	0.95***	2.53	1.63/3.86	0.76*	2.13	1.13/4.06
Planning												
Action planning							0.67**	1.95	1.17/3.22	0.58	1.78	0.59/1.21
Coping planning							0.72**	2.06	1.31/3.23	0.79**	2.71	1.51/4.90
Interaction terms												
Action planning × education										0.12**	1.12	1.04/1.21
Coping planning × education										0.10*	1.07	1.03/1.11
Action planning × dental anxiety										–0.45*	0.64	0.44/0.93
Coping planning × dental anxiety										–0.20*	0.82	0.69/0.97
R^2 Change	–			.15			.05			.06		
Nagelkerke R^2	.38			.53			.58			.64		

Note: * $p < .05$; ** $p < .01$; *** $p < .001$. [a] Women = 0, Men = 1; [b] in years.

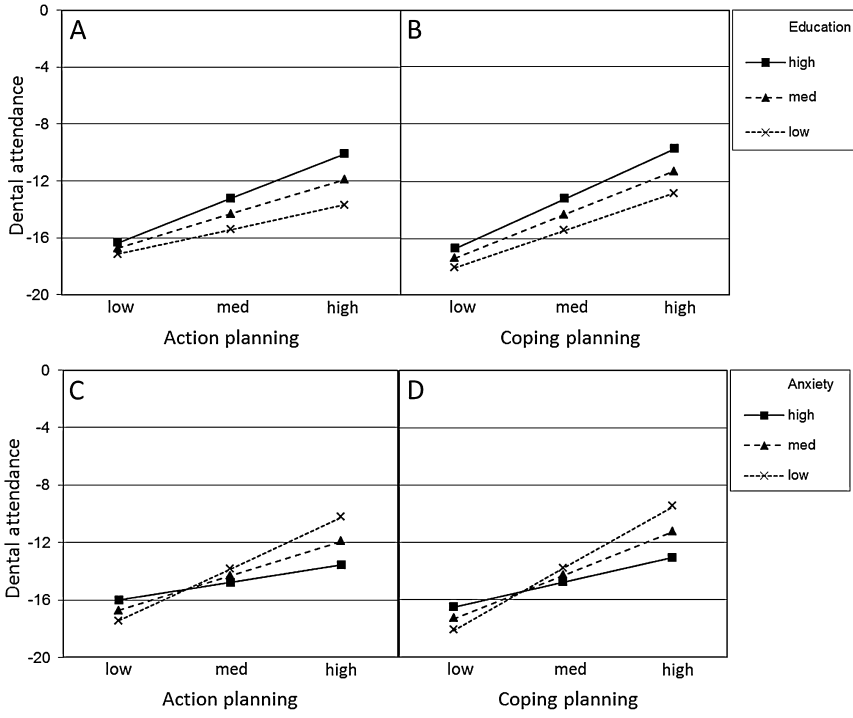

FIGURE 1. Interactions between planning and anxiety and education.

interactions (OR = 1.07) were observed. Furthermore, action planning × anxiety (OR = 0.64) and coping planning × anxiety (OR = 0.82) interactions were found in the same step, with education, dental anxiety, Time 1 dental appointment attendance, intention, PBC, and coping planning also significantly contributing to the prediction. Four simple slope analyses were conducted to display the interactions graphically. As Figure 1A demonstrates, only for high educational levels (J–N Region of significance: $z \geq 4.79$) is action planning significantly related to dental appointment attendance. Similarly (Figure 1B), coping planning significantly predicted dental appointment attendance when levels of education were higher than $z \geq 3.40$. The likelihood of dental appointment attendance at Time 2 increased when high levels of action planning accompanied low levels of anxiety (Johnson–Neyman Region of significance $z \leq 0.93$; see Figure 1C). Finally, the coping planning × dental anxiety interaction showed that dental appointment attendance at Time 2 was more likely when high levels of coping planning accompanied low levels of anxiety at $z \leq 1.21$ (Figure 1D).

DISCUSSION

The aim of the current study was to investigate the association between planning of dental appointment attendance and the actual dental appointment attendance at one-year follow-up, when controlling for past attendance, demographic factors, and dental health beliefs. In addition, the planning–attendance association was explored to determine whether dental anxiety and educational status moderated this relationship. Action planning and coping planning were significantly associated with dental appointment attendance over one year from baseline. For both types of planning, interaction effects with educational status and dental anxiety occurred. Planning was most strongly associated with dental appointment attendance in people with higher educational attainment and lower levels of anxiety.

The results presented show a positive association between the two types of planning with dental appointment attendance and are consistent with results in relation to other oral health care behaviours, where planning was positively related to dental flossing (Sniehotta et al., 2007) and to tooth brushing (Pakpour & Sniehotta, 2012). Based on previously published research evidence and evidence generated from the current study, it would be promising to assess whether an intervention to promote planning in routine dental practice could be acceptable, feasible, effective, and a low-cost solution to increase dental appointment attendance rates.

Interaction effects highlighted that planning was more predictive of appointment attendance in people with higher levels of educational attainment and lower levels of dental anxiety. This finding adds to the existing evidence base that education status moderates the intention–behaviour relationship (Conner et al., 2013; Godin et al., 2010) and contributes to our knowledge of educational differences in the planning–attendance relationship. However, the potential implication of this finding might be that planning interventions could be less effective in individuals with lower education status, and thus, there is a possibility that planning interventions might increase health inequalities because they produce a greater level of behaviour change in groups with higher as opposed to lower educational attainment levels.

The present data indicate that a minimal level of education is required for self-directed planning to be predictive of behaviour. These findings may relate to underlying differences in prospective memory and planning ability. Allan et al. (2013) have recently demonstrated that planning is less predictive for those with limited planning ability (Allan, Sniehotta, & Johnston, 2013). Allan et al. also demonstrated that planning interventions can compensate for limited planning ability. While it is unclear how the executive measures of planning ability used in the studies by Allan et al. (2013) relate to education, there is a possibility that similar compensatory effects apply to the role of

education in planning and that structured instructions to form plans may benefit individuals with lower educational attainment (Allan et al., 2013).

In relation to dental anxiety, planning was associated with increased levels of dental appointment attendance only in people with low levels of anxiety. To increase the effectiveness of planning interventions in people with dental anxiety an additional therapy module for dental anxiety (Newton, Asimakopoulou, Daly, Scambler, & Scott, 2012) might lead to higher attendance rates; however, this hypothesis warrants further investigation.

Limitations

The limitations of this study should be acknowledged. Despite the large sample size and the low dropout rate in this understudied population, the results are potentially limited to the Persian culture and/or the health and education systems in Iran. More studies are needed to compare the effects among different cultures. Furthermore, objective outcome measures were not used and it is a possibility that clinical records were biased due to incompleteness. Nevertheless, there was a substantial correlation between clinical records and self-reported attendance rates in a subsample of the study population, indicating validity of the outcome measure. Finally, the current study is prospective and not an intervention study. The development and evaluation of an intervention targeting dental appointment attendance is a logical next step.

Future Studies and Practical Implications

Published studies have reported planning as an effective intervention technique in oral care behaviour. Future studies might extend the use of action and coping planning as brief intervention components to the field of dental appointment attendance as well as implementing planning into routine dental practice, complementing the body of evidence on planning and medical attendance behaviour.

Conclusions

Linking self-regulation of patients to dental appointment attendance, the current study found action planning and coping planning to be significantly associated with dental appointment attendance behaviour one year from baseline when controlling for past attendance, demographic factors, and dental health beliefs. This replicates the robust findings of the planning–attendance relationship, but further expands it to a different health behaviour in an understudied sample. Furthermore, planning was most strongly associated with dental appointment attendance in people with higher educational attainment and lower levels of anxiety. This study provides first insights into

the likelihood that planning, when incorporated into routine dental practice, has the potential to increase dental appointment attendance rates.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interests.

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